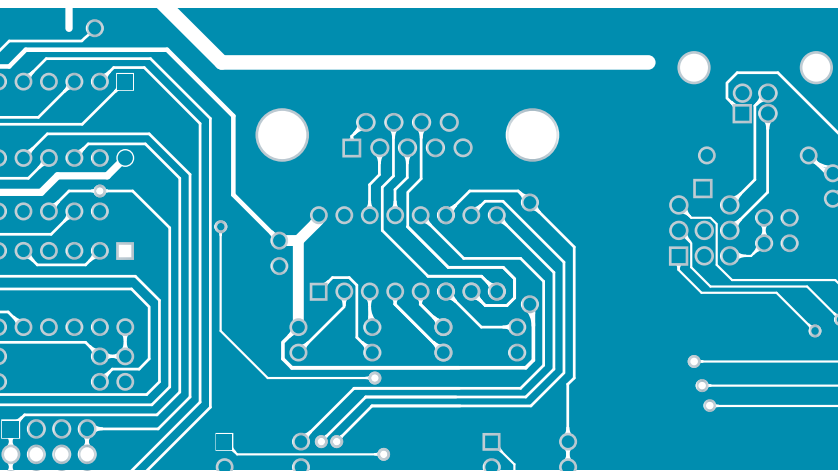
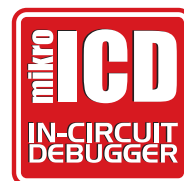
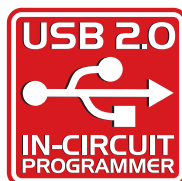


dsPICFlash



USER'S MANUAL

dsPICFlash is a high performance programmer for Microchip dsPIC flash microcontroller family. It is connected to a target device through IDC-10 connector and acts as ICSP (In-Circuit Serial Programmer) and ICD (In-Circuit Debugger) tool.



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Nebojsa Matic
General Manager

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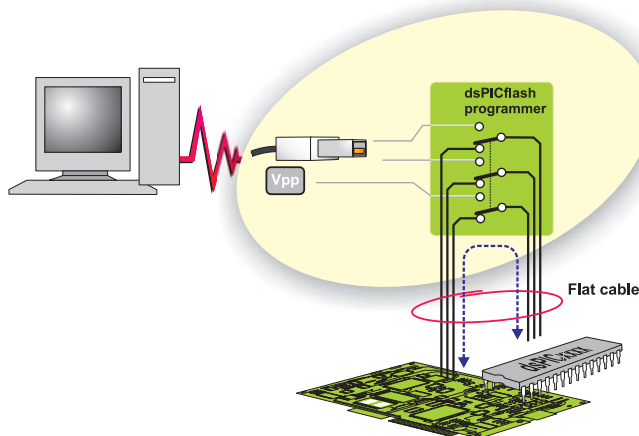
dsPICflash PROGRAMMER

Along with complementary software, *dsPICflash* programmer represents an irreplaceable tool for all those working with dsPIC microcontrollers. By means of this programmer, it is possible to program almost any dsPIC microcontroller, including those embedded (soldered) in printed board. The *dsPICflash* programmer is connected to the microcontroller via five lines. Two of them are +5V and GND, while others are used for signal transmission:

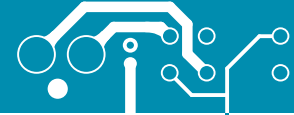
- PGC** (program clock);
- PGD** (program data); and
- MCLR** (high voltage necessary for *Flash* memory programming).

These lines are contained within a *flat* cable ending with a female IDC-10 connector. When creating a target device, the appropriate 10-pin IDC male connector with the spacing of 2.54 mm between pins should be placed on it. Connector pins should be connected to the microcontroller pins. The position of these pins varies depending on the microcontroller's type and package. The exact connection schematics are provided at the end of this manual. During operation, the *dsPICflash* programmer may be inactive or active.

Programmer is inactive

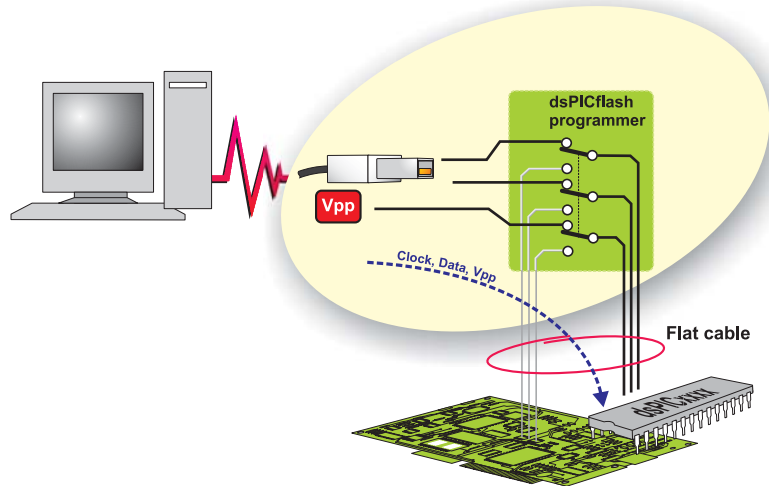


A multiplexer within the programmer connects the microcontroller pins to peripheral components on the printed board via *flat* cable. In this way, the microcontroller directly controls the operation of device with no impact of the programmer. Accordingly, even the IDC-10 connector is connected, the *dsPICflash* programmer does not affect device operation.



Programmer is active

By clicking the WRITE option, a multiplexer within programmer disconnects the microcontroller pins from the rest of on-board electronics. It allows programming of the microcontroller by using PGC, PGD and MCLR signals. When programming process is completed, *dsPICflash* automatically changes its state and becomes inactive.



If the target board has its own 5V power supply, it can also be used for powering the *dsPICflash* programmer. In this case, it is necessary to open *dsPICflash* programmer plastic case and remove the jumper for power supply selection. Otherwise, if the target board does not have its own power supply source, the jumper should be left on. In this case, the programmer, microcontroller and whole electronics are powered via programmer USB cable which connects programmer to PC. Any other power supply on the target board must be suspended.

This figure illustrates the position of jumper when the target board and programmer are powered via USB cable.



This figure illustrates the programmer with no jumper for power supply selection. In this case the programmer is powered by the target board which has its own power supply.



mikroICD (Real-Time Hardware In-Circuit Debugger)

mikroICD is a highly effective tool for real-time debugging on hardware level. It enables you to monitor all its registers and input/output pins while the program is running. mikroICD may be used with any dsPIC compiler designed by MikroElektronika (*mikroC*, *mikroBasic* or *mikroPascal*). In order to enable this mode, first select the *ICD Debug* option within the compiler. Compile the program into machine code and program dsPIC microcontroller after that. Lastly, select the appropriate debugger- *mikroICD* Debugger.

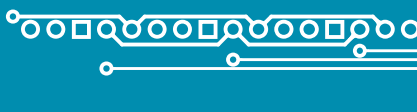
mikroICD debugger uses *dsPICflash* programmer to communicate to the microcontroller and supports common debugger commands:



Start Debugger	[F9]
Run/ Pause Debugger	[F6]
Toggle Breakpoints	[F5]
Run to cursor	[F4]
Step Into	[F7]
Step Over	[F8]
Flush RAM	[F2]
Stop Debugger	[Ctrl+F2]



Note: For more information on how to use mikroICD debugger refer to the appropriate documentation. All necessary information may also be found in HELP contained in the specified compilers.



SOFTWARE INSTALLATION

7

page

Step 1: Start installation

Insert the product CD into your PC drive. After a few seconds, a list with all MikroElektronika products will appear on the screen. To start installation of dsPICflash software, click on the setup icon:

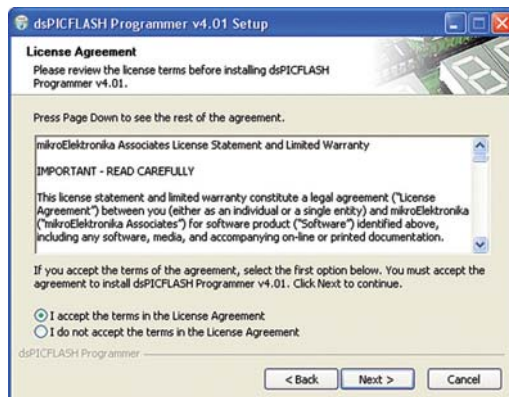
[dsPICFlash2 software for Windows](#)

You can also download *dsPICFlash_setup.exe* free of charge from our web site. In this case, you should start the installation from your hard drive. A welcome window will appear on your screen. Click 'Next' to proceed with installation.



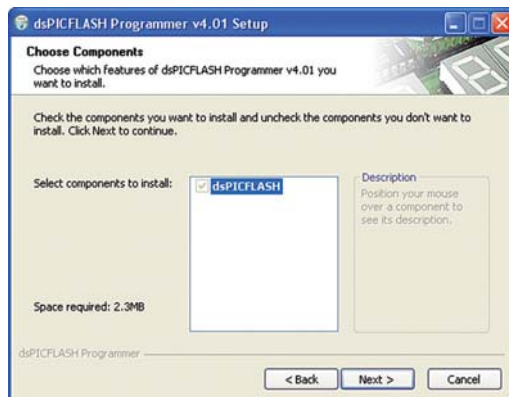
Step 2: License Agreement

Prior to starting the installation, please review the License terms. To accept them, select the option 'I accept the terms in the License Agreement' and click 'Next'.



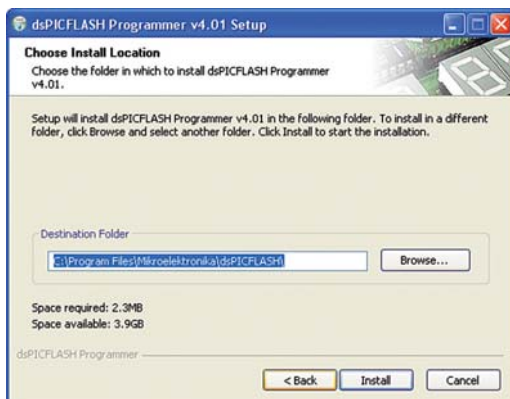
Step 3: Choose Components

For the sake of simplicity, this step of installation offers you only one component to select. Click 'Next'.



Note: Make sure that *dsPICflash* programmer is not connected to the PC during *dsPICflash* software installation.

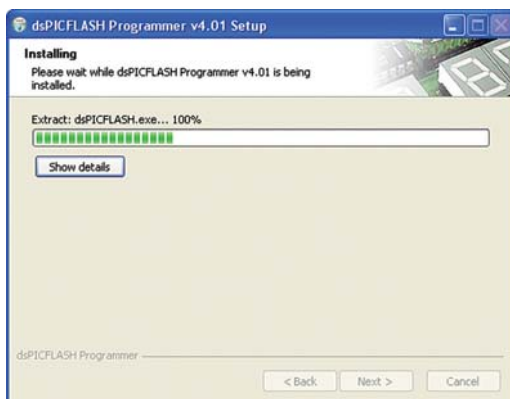
SOFTWARE INSTALLATION



Step 4: Choose Install Location

Now you should specify a folder to install the program in. If you want to install the program in the folder different from default, click 'Browse' and select another folder on hard disc. Then click 'Next'. If you choose default folder, the program will be installed in the following destination:

C:\Program Files\Mikroelektronika\dsPICFLASH



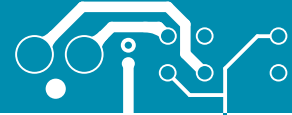
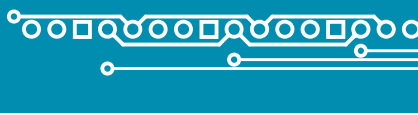
Step 5: Installation Details

dsPICflash installation will start in this step and its progress will be shown on the screen. If you are interested in details about the installation click the 'Show details' button.



Step 6: Finish

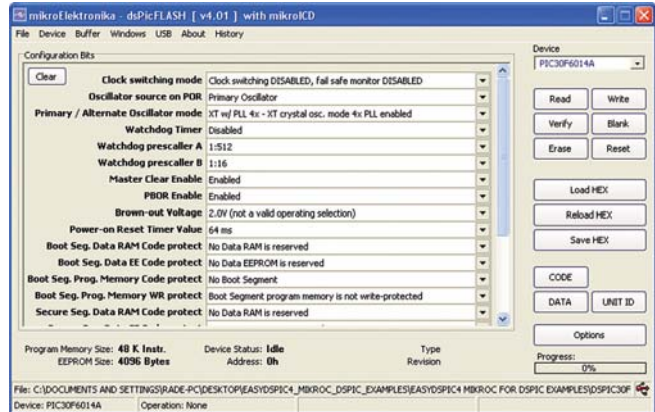
You will be notified by a window, shown in figure on the right, that Windows has successfully installed *dsPICflash*. Click 'Finish' to complete the installation process.



dsPICflash SOFTWARE

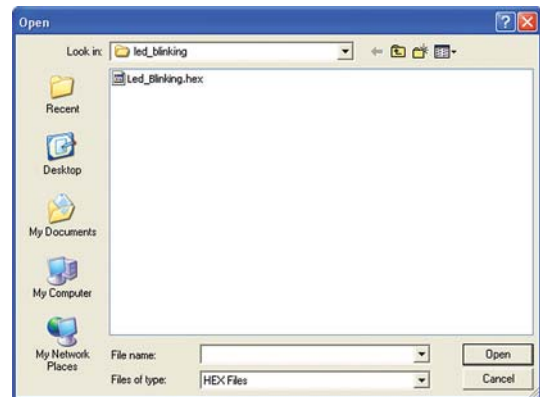
Step 1: Run dsPICflash programmer

Run *dsPICflash* from your PC. Click the *Device* option and select the appropriate microcontroller to program. *dsPICflash* will automatically set parameters for working with the specified microcontroller.



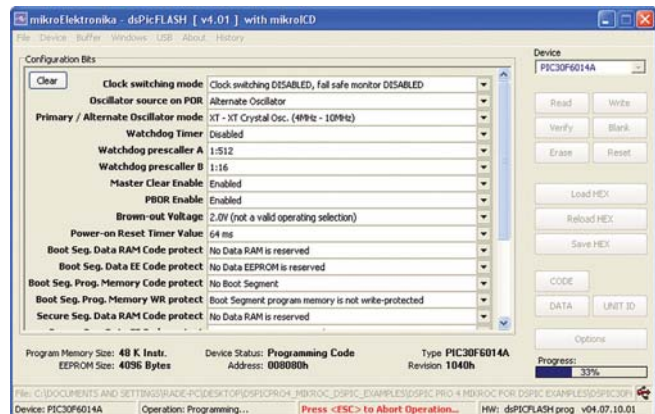
Step 2: Load HEX file

Click the *Load HEX* option which opens the window shown in figure on the right. Select the appropriate executable file (has extension .HEX in its name) and click the *Open* option. In this way, the file will be loaded into programmer buffer. On the basis of control bits stored in the HEX file, *dsPICflash* will do all necessary settings.



Step 3: Write program

Click the *Write* option in the upper right corner of the working window to start programming the microcontroller. The programming progress will be shown in the right bottom corner of the working window.



KEYBOARD SHORTCUTS AND COMMAND LINE PARAMETER

Keyboard Shortcuts

Alt-E	Erase
Alt-B	Blank check
Alt-W	Write
Alt-V	Verify
Alt-R	Read
Alt-D	Change MCU
Ctrl-S	Save
Ctrl-O	Open (Load)
Ctrl-R	Reload

Command Line

Alternatively, you can use *dsPICflash* programmer from the command line. It will enable you to use *dsPICflash* programmer from some other software, compiler etc. Here is the list with command line parameters:

-w	Write to dsPIC
-v	Verify
-e	Erase dsPIC
-r	Read from dsPIC
-p	dsPIC name (for example: P30F4013, P30F3014...)
-f	File name (must be enclosed with " ")
-b	Blank check
-q	Close <i>dsPICflash</i> after programming

Example 1 **dspicflash2.exe -w -pdsPIC30F4013 -v -f"C:\somefile.hex"**

This will program the dsPIC using C:\somefile.hex. Immediately after write, it will verify loaded file.

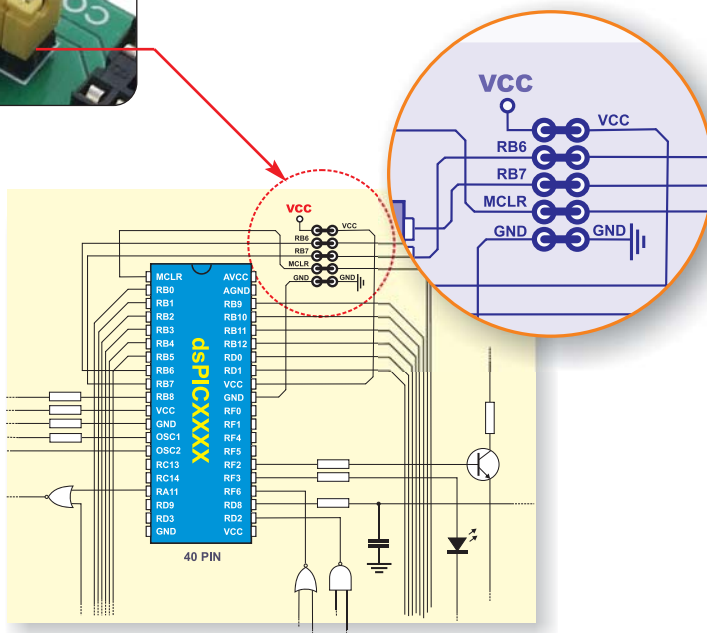
Example 2 **dspicflash2.exe -r -pdsPIC30F4013**

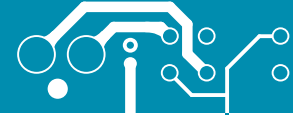
This will read the dsPIC program memory.

Example 3 **dspicflash2.exe -e -pdsPIC30F4013**

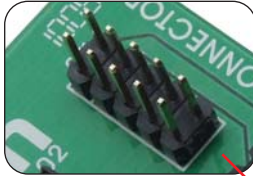
This will erase program from the dsPIC microcontroller.

Instead of five independent jumpers, you should place a male IDC-10 connector with the spacing of 2.54mm between pins. During normal operation, its pins must be linked as shown in figure below. In this way, the microcontroller pins are connected to the rest of on-board electronics. Refer to the Figure below.

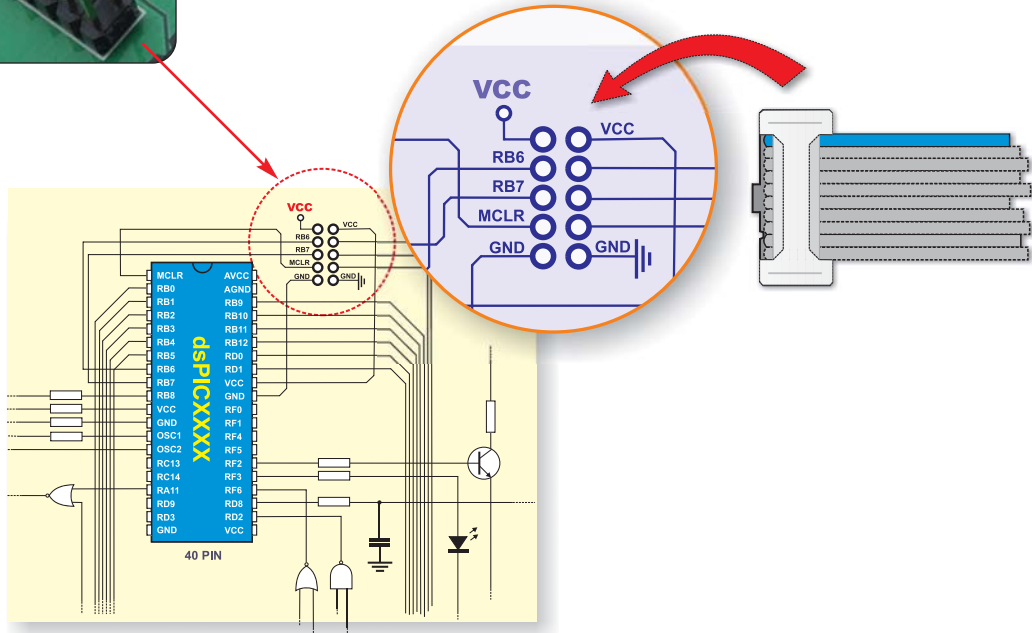




During programming, the same connector is used to bring signal from the programmer. To enable it, you have to remove jumpers from the board. Instead of them, place a programmer female connector over the on-board male connector.



On-board IDC-10 male connector. Jumpers are removed to enable connection to the *dsPICflash* programmer.



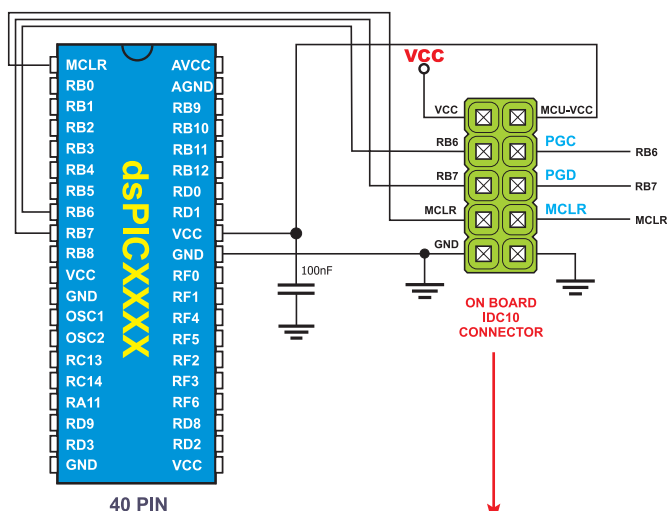
Apart from programming the microcontroller, *dsPICflash* also enables *In Circuit Debugger* contained in all compilers designed by MikroElektronika. This program enables the microcontroller to operate in real environment and execute instructions step by step. It also enables the user to simultaneously monitor all MCU registers while the program is running.



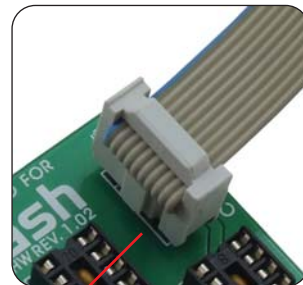
Note: *In-Circuit Debugger* cannot monitor the state of the RB6 and RB7 pins since they are used for communication to the programmer.

dsPICflash PROGRAMMER CONNECTION

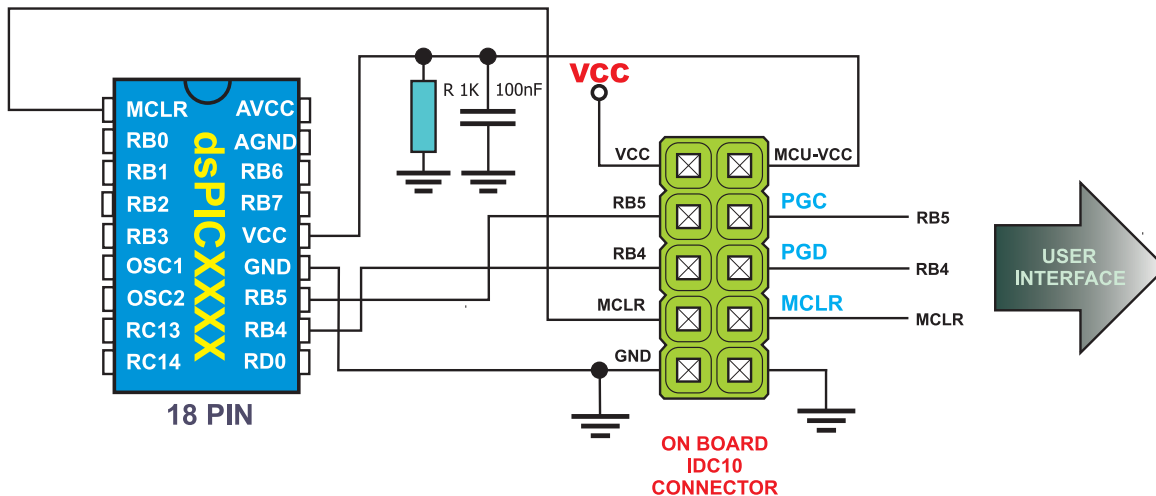
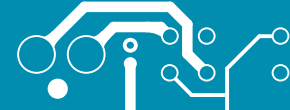
In order to enable a dsPIC microcontroller programming via *dsPICflash* programmer it is necessary to connect them. One of the possibilities of such connection is by using a male IDC-10 connector. For this reason, it is necessary to provide space on printed board for this connector when designing a device. Pins of this connector are between the microcontroller pins (VCC, GND, MCLR, RB6 and RB7) and components they use. The appropriate schematic is shown in figure below. Once you plug in the *dsPICflash* connector you will be able to program the microcontroller. Switching the connector pins by jumpers enables device to operate in real environment as per project.



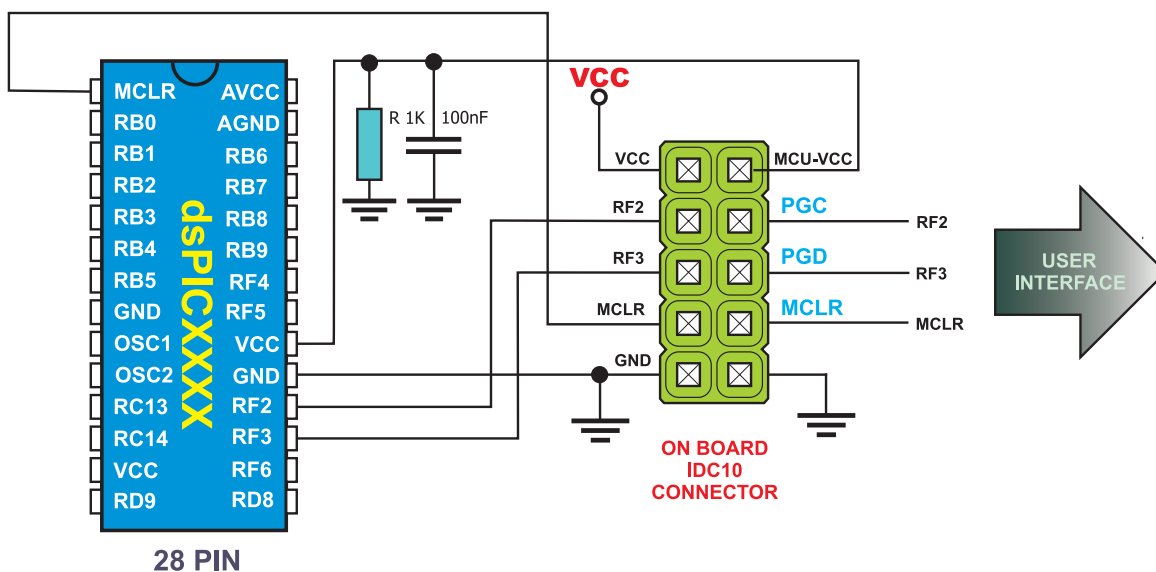
dsPICflash programmer connector in position for programming or monitoring the operation of the microcontroller by using *In-Circuit Debugger* program.



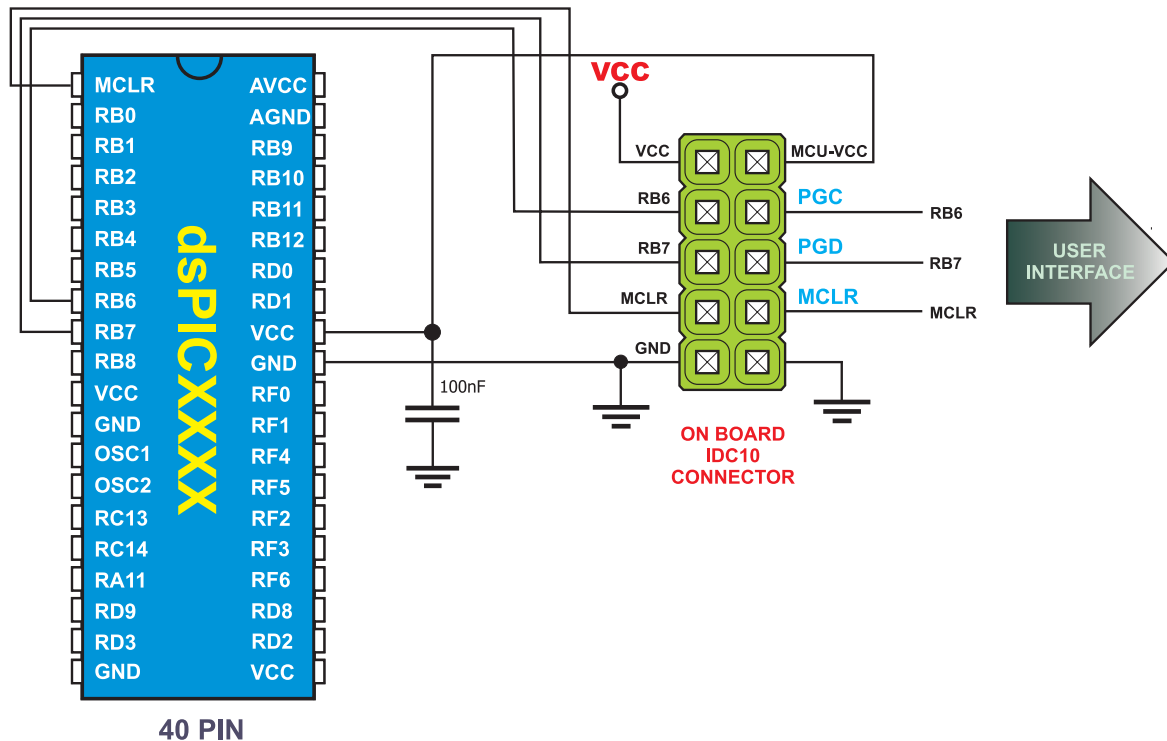
Note: Figure above illustrates connection between IDC connector and microcontroller pins. Pay attention to the connection of the VCC pin for power supply.



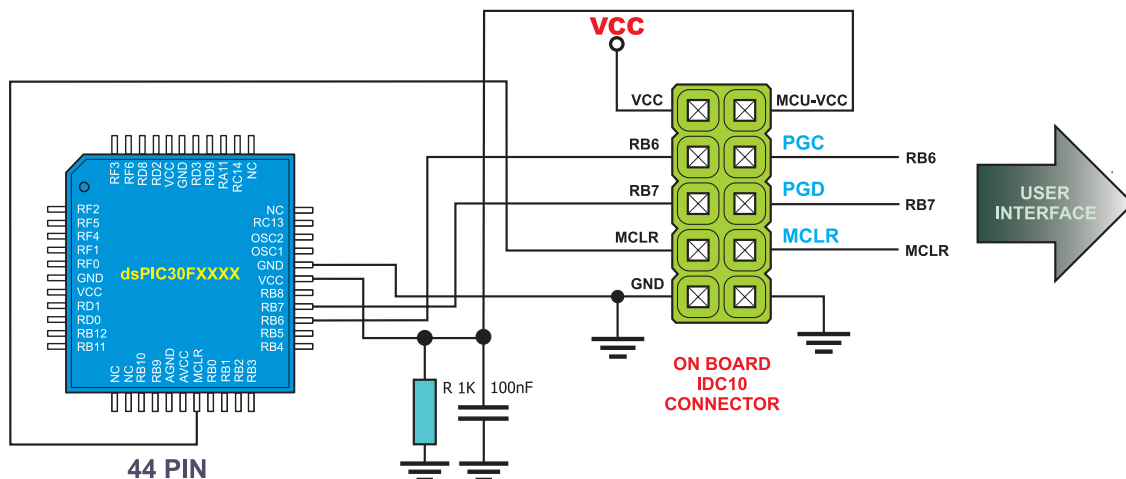
Connection schematic for on-board male IDC-10 connector and 18-pin dsPIC30F microcontrollers such as **dsPIC30F3012**, 2011...



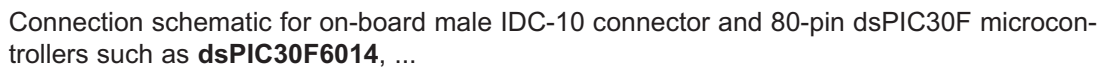
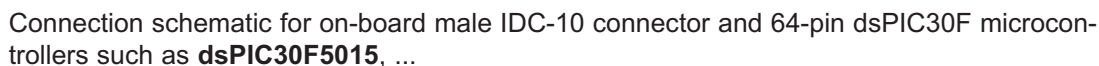
Connection schematic for on-board male IDC-10 connector and 28-pin dsPIC30F microcontrollers such as **dsPIC30F2012**, 3013....

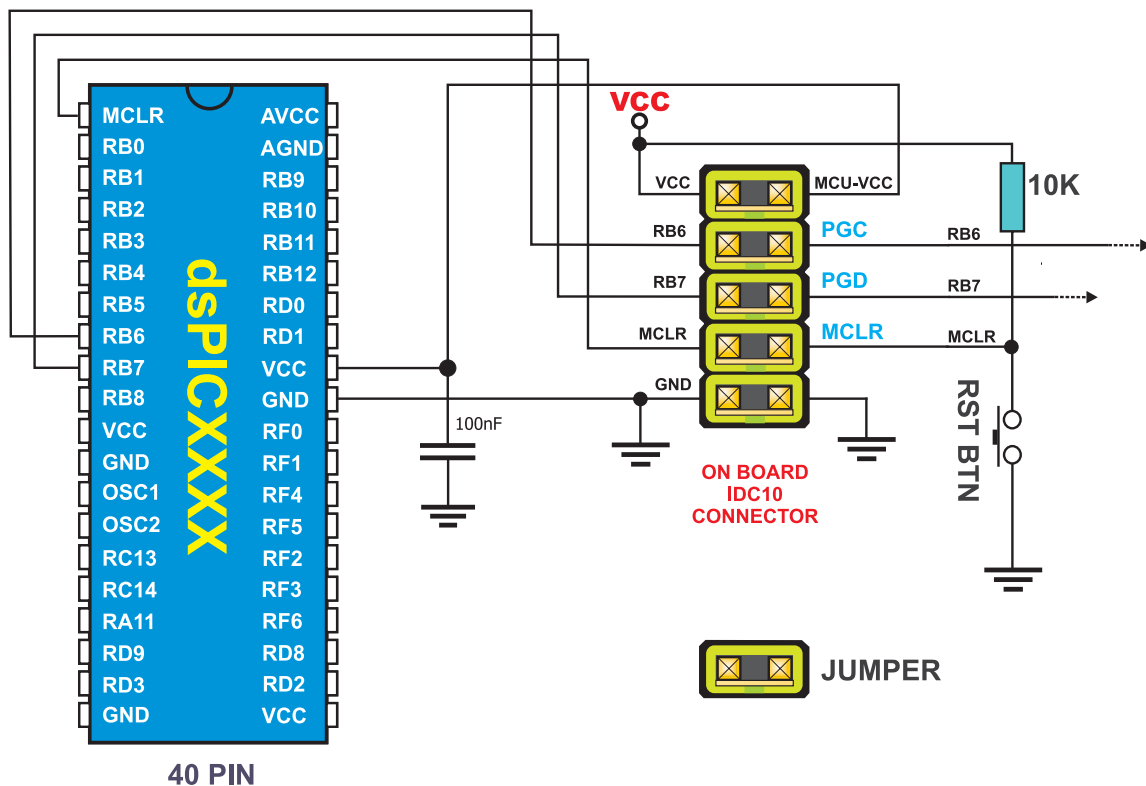


Connection schematic for on-board male IDC-10 connector and 40-pin dsPIC30F microcontrollers such as **dsPIC30F3014**, ...



Connection schematic for on-board male IDC-10 connector and 44-pin dsPIC30F microcontrollers such as **dsPIC30F3014**, ...





After the programming process and device development are finished, the male IDC10 connector pins must be switched by jumpers. It enables pins MCLR, RB6 and RB7 to be connected to the rest of on-board electronics, which then enables device to operate normally without *dsPICflash* programmer. If needed, the jumpers can be removed and *dsPICflash* can be reconnected for reprogramming the chip.



Note: Target board must not have electrolytic capacitors between the microcontroller pins and embedded IDC10 connector since the power supply voltage is controlled by the *dsPICflash* programmer.

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